REMARKS

The Final Office Action mailed on February 15, 2002, has been received and reviewed. Claims 1-13 are currently pending in the application. Each of claims 1-13 stands rejected.

Reconsideration of the above-referenced application is respectfully requested.

Rejections Under 35 U.S.C. § 102(b)

Claims 1-13 stand rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent 5,275,972 to Ogawa et al. (hereinafter "Ogawa").

A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference. *Verdegaal Brothers v. Union Oil Co. of California*, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). The identical invention must be shown in as complete detail as is contained in the claim. *Richardson v. Suzuki Motor Co.*, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989).

Ogawa describes intermediate semiconductor device structures that include contact openings for conductively doped source and/or drain regions of a semiconductor substrate. The contact openings are positioned between adjacent transistor gates and may include sidewalls that are oriented substantially perpendicular to a plane of the semiconductor substrate.

One of the intermediate semiconductor device structures described in Ogawa and illustrated in FIG. 1C thereof includes a semiconductor substrate 2 with active device regions 6 formed therein. Conductive lines 4 are disposed upon substrate 2 and flanked by sidewall spacers 5. An undoped silicon dioxide cap 8 is disposed over and in contact with each conductive line 4. In addition, the intermediate semiconductor device structure shown in FIG. 1C of Ogawa includes a silicon dioxide film 9, as well as a silicon nitride film 10 thereover, which together act as an etch stop layer. Col. 8, lines 53-56. A passivation layer 11, which is formed from borophosphosilicate glass (BPSG), overlies silicon nitride film 10. As depicted in FIG. 1C, a contact aperture (unnumbered) is defined through passivation layer 11. As an isotropic etching process is used to form the contact aperture through passivation layer 11 (col. 8,

line 67, to col. 9, line 3, and as depicted in FIG. 1C), the sidewalls of the contact aperture defined through passivation layer 11 are not oriented substantially perpendicularly to a plane of semiconductor substrate 2. Further, the sidewalls of the contact aperture appear to terminate at silicon nitride film 10. FIG. 1D depicts the same structure further along in the fabrication process. In FIG. 1D, the contact aperture extends through both silicon nitride film 10 and the underlying silicon oxide film 9, with sidewalls of a contact aperture defined by silicon oxide film 9, not passivation layer 11, terminating at sidewall spacers 5 rather than at silicon dioxide cap 8.

Ogawa also describes various other intermediate semiconductor device structures, which are labeled as being prior art to the structures depicted in FIGs. 1C and 1D. One such structure is depicted in FIG. 9C and includes a passivation layer 44 of BPSG with a contact aperture 50 formed therethrough. Again, the sidewalls of contact aperture 50 are depicted as being formed by isotropic processes and, thus, as not being oriented substantially perpendicularly relative to a plane of a substrate 2 of the intermediate semiconductor device structure. A silicon nitride film 43 is located directly beneath passivation layer 44 and directly overlies a silicon dioxide film 42 which, in turn, is positioned over and in contact with a silicon dioxide cap 8 over a transistor electrode 4. Silicon nitride film 43 acts as an etch stop during formation of contact aperture 50 through passivation layer 44. Col. 1, lines 63-66. Following formation of the contact aperture through passivation layer 44, anisotropic etching processes may be used to form contact apertures through silicon nitride film 43 and silicon dioxide film 42, with silicon dioxide cap 8 being exposed through the series of communicating contact apertures.

Another prior art structure is depicted in FIG. 13A and includes a passivation layer 11, a polysilicon film 41 underlying passivation layer 11, and a silicon nitride film 43 underlying polysilicon film 41. Polysilicon film 41 acts as an etch stop while a contact aperture (unnumbered) is being formed through passivation layer 11. Col. 2, lines 59-67. Silicon nitride film 43 protects active device regions 6 (*i.e.*, source/drain regions) of a substrate 2 of the intermediate semiconductor device structure from being oxidized when portions of polysilicon film 41 are oxidized to facilitate removal thereof. Col. 3, lines 7-9. Following oxidation of

portions of polysilicon film 41, the contact aperture defined by passivation layer 11 may communicate with contact apertures formed through both the oxidized portions of polysilicon film 41 and through silicon nitride film 43.

Independent claim 1 recites a semiconductor device that includes, among other things, a substrate, at least one conductive line, and an undoped silicon dioxide cape disposed over and in contact with the at least one conductive line. In addition, the semiconductor device of independent claim 1 includes a passivation layer over the undoped silicon dioxide cap and at least one contact aperture defined through the passivation layer. The at least one contact aperture includes at least one sidewall that extends "substantially perpendicularly" relative to the substrate, with "at least a portion of [the] at least one sidewall terminating at [the] undoped silicon dioxide cap."

In contrast to independent claim 1, Ogawa lacks any express or inherent description of a semiconductor device with at least one contact aperture defined through a passivation layer and including at least one sidewall that extends substantially perpendicularly to a substrate of the semiconductor device and that terminates at an underlying undoped silicon dioxide cap.

Instead, the sidewalls of the Ogawa contact aperture defined through passivation layer 11 of the device shown in FIGs. 1C and 1D are curved and, thus, not substantially perpendicular to the substrate 2 of that device. Moreover, the sidewall of the contact aperture defined through passivation layer 11 does not terminate at an undoped silicon dioxide cap 8 of the structure but, rather, at the underlying silicon nitride layer 10. The contact aperture which is defined through passivation layer 44 of the structure depicted in FIG. 9C of Ogawa likewise has curved sidewalls that terminate at a silicon nitride film 43. While the contact aperture defined through passivation layer 11 of the device shown in FIG. 13A of Ogawa has sidewalls that are oriented substantially perpendicularly relative to the substrate 2 of that device, the sidewalls of the contact aperture defined through passivation layer 11 terminate at the underlying polysilicon film 41, which separates passivation layer 11 from the underlying silicon nitride film 43 and undoped silicon oxide cap 8. The sidewalls of the contact aperture defined by passivation layer 11 of the device

depicted in FIG. 13a, therefore, do not terminate at the undoped silicon dioxide cap 8 of that device.

For these reasons, it is respectfully submitted that Ogawa does not anticipate each and every element of independent claim 1. It is, therefore, respectfully submitted that, under 35 U.S.C. § 102(b), independent claim 1 is allowable over Ogawa.

Each of claims 2-5 is further allowable, among other reasons, as depending from claim 1, which is allowable.

Independent claim 6 recites a semiconductor device that includes, among other things, a substrate, at least one undoped silicon oxide structure, and at least one doped silicon oxide structure over the at least one undoped silicon oxide structure. The at least one doped silicon oxide structure includes at least one sidewall substantially perpendicular to a plane of the substrate. At least a portion of the at least one sidewall terminates at the at least one undoped silicon oxide structure that underlies the at least one doped silicon oxide structure.

By way of contrast with independent claim 6, Ogawa lacks any express or inherent description of a semiconductor device that includes a doped silicon oxide structure with a sidewall that is substantially perpendicular to a plane of a substrate of the device and that at least partially terminates at an underlying undoped silicon oxide structure. Rather, the doped silicon oxide structure (*i.e.*, passivation layer 11) of the device depicted in FIGs. 1C and 1D of Ogawa includes curved sidewalls, which cannot be oriented substantially perpendicular to a plane of an underlying substrate 2. Also, the sidewalls of the doped silicon oxide structure of the device depicted in FIGs. 1C and 1D of Ogawa terminate at an underlying silicon nitride film 43, not at the underlying undoped silicon oxide structure (*i.e.*, silicon dioxide cap 8). Likewise, the sidewalls of the doped silicon oxide structure (*i.e.*, passivation layer 44) of the device depicted in FIG. 9C of Ogawa are curved and terminate at an underlying silicon nitride film 43. The sidewalls of the doped silicon oxide structure (*i.e.*, passivation layer 11) of the structure depicted in FIG. 13A of Ogawa terminate at a polysilicon film 41 rather than at an underlying undoped silicon oxide structure, such as the silicon dioxide cap 8 shown in FIG. 13A.

Accordingly, it is respectfully submitted that Ogawa does not anticipate each and every element of independent claim 6. Thus, it is respectfully submitted that, under 35 U.S.C. § 102(b), independent claim 6 is allowable over Ogawa.

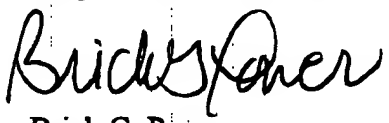
Claims 7-13 are each allowable, among other reasons, as depending either directly or indirectly from claim 6, which is allowable.

In view of the foregoing, it is respectfully requested that the 35 U.S.C. § 102(b) rejections of claims 1-13 be withdrawn.

CONCLUSION

It is respectfully submitted that each of claims 1-13 is allowable. An early notice of the allowability of each of these claims is respectfully solicited, as is an indication that the above-referenced application has been passed for issuance. If any issues preventing the allowance of any of claims 1-13 remain which might be resolved by way of a telephone conference, the Office is kindly invited to contact the undersigned attorney.

Respectfully Submitted,



Brick G. Power
Registration Number 38,581
Attorney for Applicants
TRASKBRITT, PC
P.O. Box 2550
Salt Lake City, Utah 84110
Telephone: (801) 532-1922

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